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1 DRILLING AND DOWELLING TOOLS

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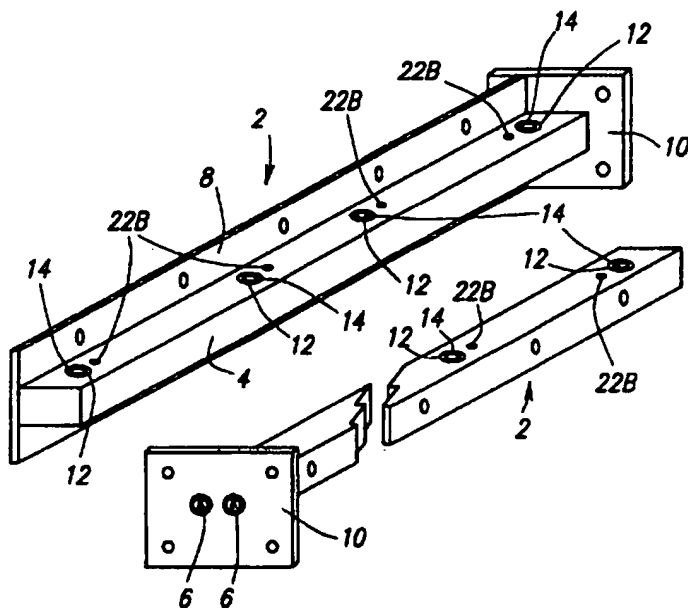
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB96/02478 (22) International Filing Date: 11 October 1996 (11.10.96) (30) Priority Data: 9521039.9 13 October 1995 (13.10.95) GB (71)(72) Applicant and Inventor: CAPPER, John [GB/GB]; 68 Hillside Court, Leeds, West Yorkshire LS7 4NJ (GB). (74) Agent: WATSON, Anthony, Stephen, Watson; 2 Lea Croft, Clifford, Wetherby, West Yorkshire LS23 6EY (GB).</p>		<p>(81) Designated States: AU, BA, CA, CN, CU, FI, IL, JP, KR, LC, NO, NZ, PL, US, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report.</i> <i>With amended claims.</i></p>

(54) Title: DRILLING AND DOWELLING TOOLS



(57) Abstract

A drilling and dowelling tool (2) comprises a body (4) having one or more through-holes (12) therein and carrying at least one plate (8-10) so as to enable the body (4) to be accurately located relative to an item to be drilled. The body of the tool (4) will be generally rectangular or V-shaped, and means will be provided to adjust the position of the plate relative to the body and/or the positions of the through-holes relative to an item to be drilled.

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DRILLING AND DOWELLING TOOLS

05 This invention relates to drilling and dowelling tools for
use in the construction of joinery, cabinet and furniture
making and the like.

10 The manufacture of joinery, cabinets and furniture often
involves the joining together of various pieces of timber,
such as in the provision of divisional boards, and in the
formation of joints, by means of dowelling, and it is
essential that the holes for the dowels are accurately
located on the pieces of timber to be joined.

15 Conventional drilling and dowelling tools are complicated
and expensive structures, and the present invention seeks
to provide a drilling and dowelling tool which will
obviate the disadvantages of known drilling and dowelling
20 tools.

25 According to the present invention there is provided a
drilling and dowelling tool comprising a body having one
or more through-holes therein, said body carrying at least
one plate so as to enable said body to be accurately
located relative to an item to be drilled. Preferably,
means will be securable to said body and/or said plate to

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enable the edges of said tool to be adjusted.

05 In a first embodiment of the invention, the said body will preferably be rectangular in cross-section and will preferably be elongate, and the body will preferably carry at least one removable, adjustable side and/or end plate.

10 Preferably, the said body will carry two plates which are located normal to each other and which are movably secured to the ends and sides of the body, and there may be adjustment means located between said plates and said body.

15 The through-holes in the body may be tapered to receive removable/replacable plugs or bushes each having a through-hole into which the drill bit will be inserted when using the tool.

20 The plate(s) secured to the body will preferably be capable of receiving packing plates and/or spacer plates which are releasably secured to said plate(s) and which serve to adjust the effective position of the plate(s)
25 relative to said body.

In an alternative embodiment of the invention, the body

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may be provided with a slidable member which is movable relative to said body so that the through-holes in said
05 body and a work-piece to be drilled may be relatively adjusted.

In a further alternative embodiment of the invention, the body may be constituted by a generally V-shaped member
10 having one or more through-holes therein, said through-holes being located at the intersection of the arms or legs of the generally V-shaped member, each of said arms or legs carrying a removable plate.

15 In order that the invention may be more readily understood, embodiments thereof will now be described, by way of example, reference being made to the accompanying drawings, wherein:

Figure 1 shows an external perspective view of a general
20 drilling and dowelling tool according to the invention;
Figure 2 is a view from the other end of Figure 1 and with a part of the tool removed;

Figures 3A to 3C show the attachment of end and side plates and spacer or packing plates to the tool of Figures
25 1 and 2;

Figure 4 is an external perspective view of a tool according to an alternative embodiment of the invention;

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Figure 5 is an internal perspective view of the tool of Figure 4;

05 Figures 6 and 7 are views of the tool of Figures 4 and 5 with one of the plates removed in each view and showing adjustment means for the external edges of the tool;

Figures 8 and 9 are views similar to Figures 6 and 7 but showing adjustment means for internal edges of the tool;

10 Figure 10 is a perspective view of the tool of Figures 4 and 5 and showing internal adjustment means to the side and end plates of the tool;

Figure 11 is a cross-sectional elevation of the tool of Figure 5 with the plates removed;

15 Figure 12 is a perspective view of a drilling and dowelling tool according to a further alternative embodiment of the invention;

Figure 13 is an elevation of a vertical adjustment sliding plate for use with the tool of Figure 12;

20 Figures 14 and 15 show the part of Figure 13 in position relative to the tool of Figure 12 when used for drilling a dowel or other circular section;

Figure 16 is a perspective view of a drilling and dowelling tool according to another alternative embodiment
25 of the invention;

Figures 17 to 19 are respectively plan, front and rear elevations of the tool of Figure 16;

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Figures 20 to 23 are views similar to Figures 16 to 19 but showing a variation thereof; and

05 Figures 24 to 27 are views similar to Figures 16 to 19 but showing further variations thereof.

Referring to the drawings and firstly to Figures 1 and 2, a drilling and dowelling tool, indicated generally by
10 reference numeral 2, comprises an elongate body 4 having removably secured thereto by threaded screws - two being shown by reference numerals 6 - a side plate 8 and an end plate 10. As will be seen, the body is provided with spaced holes 12 in which are located removable bushes or
15 plugs 14 through which a drill may pass when the jig is in use. The body 4 and side and end plates 8 and 10 may be made of metal, plastics material or any other suitable material.

20 Figures 3A to 3C more specifically show the attachment of the side plate 8 to the body 4, and Figures 3B and 3C also show the use of packing pieces or spacer plates to enable the relative positions of the body 4 and side plate 8 to be adjusted.

25

The packing pieces or spacer plates are indicated at 13. In Figure 3B they are shown between the body 4 and side

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plate 8, and in Figure 3C they are also shown at either side of the body 4. The packing pieces or spacer plates 13
05 are secured in position at either side of the body 4 by countersunk machine screws 16 and nuts 18 as shown in Figure 3C.

Washers 20 - see Figures 3B and 3C - may be provided
10 between the packing pieces or spacer plates 13 in order to afford some fine degree of adjustment between the body 4 and plate 8.

Referring now to Figures 4 and 5, the drilling and dowell-
15 ing tool comprises a body 22 which, as will be seen, is of rectangular cross-section. The body, which may be made of metal, plastics material, or other suitable material, is provided with a plurality of through-holes 24 and carries adjustable and removable end and side plates 26 and 28
20 respectively, the plates as earlier mentioned being secured to the body 22 by means of threaded screws 30 and 32 engaging in threaded holes in the ends and sides of the body 22, such holes being indicated by reference numerals 34 and 36 in Figure 5. From Figure 5, it will be
25 appreciated that the plates 26 and 28 may be located to either of the sides of the body 22 and/or either of the ends of the body 22.

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In the illustrations of Figures 4 and 5, it will be seen that the plates 26 and 28 are in close contiguous relationship with the body 22 in that they abut the body 22 and in mutual close contiguous relationship in that they abut each other.

Reference to Figure 6 - in which the side plate 28 has been removed - will show that the end plate 26 is spaced from the body 22 by means of washers, two such washers 38 having bores of the order of 4mm in diameter being illustrated. In addition, spacer plates 40 are located at the end of the body 22 and between the body 22 and the washers 38, the spacer plates 40 and washers 38 being secured to the body 22 by means of the threaded screws 30 (Figure 4) passing through the end plate 26.

A similar arrangement is shown in Figure 7 but as applied to the side of the body 22 - the end plate 26 having been removed - in which a spacer plate 42 and washers 42A are located between the side plate 28 and the side of the body 22, the washers and spacer plates being secured to the body 22 by means of the threaded screws 32 (Figure 4) passing through the side plate 28.

Thus the arrangements shown in and described with

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reference to Figures 6 and 7 provide adjustment means for the external edges (sides and ends) of the drilling and
05 dowelling tool.

Figures 8 and 9 illustrate adjustment means for the internal edges (sides and ends) of the tool. In Figure 8, the end plate 26 abuts the end of the body 22 and mounted
10 relative to the body 22 are packing plates or pieces 44 which are secured to the end plate 26 by means of threaded screws 46 (Figure 10) passing through countersunk holes in the packing plates or pieces 44 and engaging in threaded
15 holes 48 (Figures 4 and 5) in the end plate 26, washers 50 being located between the packing plates or pieces 44 and the end plate 26. Instead of the holes 48 being threaded, the screws may be engaged by nuts.

Similarly, referring now to Figure 9, packing plates or
20 pieces 52 are secured to the side plate 28 by means of threaded screws 54 (Figure 10) passing through countersunk holes in the packing plates or pieces and engaging in threaded holes 56 (Figures 4 and 5) in the side plate 28, washers 58 being located between the side plate 28 and the
25 packing plates or pieces 52. Again, as mentioned above, the screws 54 may be engaged by nuts instead of the holes 56 being threaded.

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Figure 10 illustrates adjustment means fitted both to the end and side of the body 22 of the drilling and dowelling tool, the arrangement being as described with reference to Figures 8 and 9.

Locatable in the holes 24 in the body 22, referring now to Figure 11, are knock-out bushes or plugs 60 - two such bushes or plugs are shown in the Figure - each of which has a through-hole therein, these bushes or plugs being adapted to receive and guide a drill bit (not shown) when the tool is being used. Such bushes or plugs may be located in any and selected ones of the through-holes 24 in the body 22, whereby the drilling position(s) of a piece of timber or other material may be changed or varied to suit particular requirements and applications. The bushes or plugs may have parallel sided external walls (as illustrated) or such walls may be tapered. The bushes or plugs 14 in Figures 1 and 2 are similarly arranged.

The small holes 22A in Figure 10 - as well as the small holes 22C in Figure 5 - are provided so that purpose-made templates (not shown) may be attached to the body 22 to enable awkward shapes to be drilled and the required holes to be accurately located in such awkward shaped pieces. The small holes 22B in Figure 1 are to give the facility

- 10 -

of drilling a workpiece (not shown) when dowelling is not to be used.

05

Referring now to Figure 12, the drilling and dowelling tool shown comprises a body 70 having a removable side plate 72 and being provided with a plurality of through-holes 74 in selected ones of which may be located bushes or plugs 74A. A horizontally slidable adjustable plate 76 is secured to the body 70 by means of screws or bolts 78, the plate 76 being provided with slots 80 and 82 whereby the plate 76 may be moved longitudinally relative to the body 70 so as to adjust the end position against which an item to be drilled will abut.

10
15

Figure 13 shows a vertical adjustable sliding plate 89 for use with any of the tools described above and affords the facility of vertically adjusting the height of the body of the tool relative to a workpiece to be drilled.

20

The sliding plate 89 is shown in use in Figures 14 and 15. In Figure 14, the tool - for example the tool 70 (with the plate 76 removed - is shown in position for drilling a length of dowelling 84 or other round section, an off-cut 84A of dowel being used to support the outboard end of the tool. The side plate 72 is carried on the vertical

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adjustable sliding plate 89 - having slots 89A and 89B
(Figure 13) - packings 88 being provided so as to
05 correctly locate the required positions of the drilling
hole(s) with respect to the dowelling or other round
section to be drilled.

Figure 15 is a view similar to Figure 14, but showing a
10 method of drilling dowellings of varying sizes if the
plate 89 is adjusted.

Figures 16 to 19 illustrate a generally V-shaped drilling
and dowelling tool, indicated generally by reference
15 numeral 90, which is usable for drilling holes in corners
or joints of articles. The tool 90 has arms 92 and 94, the
included angle of which is 90° . Each arm 92 and 94 carries
a removable plate respectively referenced 96 and 98, the
plates 96 and 98 being secured to their respective arms by
20 means of screws 100 engaging threaded holes (not shown) in
the arms. Extending through the tool 90, and normal to the
apex of the generally V-shaped tool, are drilling holes
102 and 104 which, as will be seen, are of differing
diameters.

25

Thus, if a work-piece or article is placed in the V-shape
between the arms 92 and 94, the work-piece or article may

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be drilled by passing a drill (not shown) through one of
the holes 102 and 104, depending upon the size of the
05 dowel to be used.

In order for the positions of the holes 102 and 104 to be
adjusted relative to the work-piece or article, the plates
96 and 98 are provided with holes 106 and 108 respectively
10 so that spacer plates or packing pieces (not shown) may be
removably secured to said plates as previously described.

Figures 20 to 23 and 24 to 27 show drilling and dowelling
tools similar to the one shown in Figures 16 to 19, but
15 having included angles respectively of 60° and 120° , and
therefore like parts to those of Figures 16 to 19 are
given the suffixes 'A' and 'B' in Figures 20 to 23 and
Figures 24 to 17 respectively.

20 The use of the drilling and dowelling tools according to
the invention will be readily apparent to those skilled in
the art, and therefore it is not thought necessary here to
detail their use.

25 Thus the invention provides drilling and dowelling tools
which are relatively inexpensive to manufacture and which
will be readily and easily usable by both professional

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craftsmen and DIY enthusiasts. In addition, the tools enable the formation of alternatives to the traditional mortice and tenon joint when such a joint is not necessarily required. The provision of the tools and the added facility of the spacer plates and the packing plates or pieces, together with the facility of changing the drilling positions, give the tool a universal application and are therefore usable in many different timber sizes for numerous purposes, the use of the washers providing fine adjustment of the relative dispositions of the body and the plates where appropriate.

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CLAIMS

- 05 1. A drilling and dowelling tool comprising a body having one or more through holes therein, said body carrying at least one plate so as to enable said body to be accurately located relative to an item to be drilled.
- 10 2. A tool according to Claim 1, wherein means are securable to said body and/or said plate to enable the edges of said tool to be adjusted.
- 15 3. A tool according to Claim 1 or Claim 2, wherein said body is rectangular in cross-section and elongate, said body carrying at least one removable, adjustable side and/or end plate.
- 20 4. A tool according to Claim 3, wherein said body carries two plates which are located normal to each other and which are movably secured to the ends and sides of the body.
- 25 5. A tool according to Claim 4, wherein the plate(s) secured to the body are capable of receiving packing plates and/or spacer plates which are releasably secured to said plate(s) and which serve to adjust the effective

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position(s) of the plate(s) relative to said body.

- 05 6. A tool according to Claim 5, wherein means are locatable between said plate(s) and said packing plate(s) or spacer plate(s) to provide fine adjustment of the relative position(s) of said body and said plate(s).
- 10 7. A tool according to Claim 1, wherein said body is provided with a slidable member which is movable relative to said body so that the positions of said through-holes in said body and a work-piece to be drilled may be relatively adjusted.
- 15 8. A tool according to any of Claims 1 to 7, wherein said through-holes in said body have removable/replacable plugs or bushes located therein, said plugs or bushes each having a through-hole therein through which a drill bit
- 20 may pass in use of the tool.
- 25 9. A tool according to Claim 1, wherein said body is constituted by a generally V-shaped member having one or more through-holes therein, said through-holes being located at the intersection of the arms or legs of the generally V-shaped member, each of said arms carrying a removable plate.

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10. A tool according to Claim 9, wherein said body has
two through-holes therein, said holes being of differing
05 diameters.

11. A tool according to Claim 10, wherein the included
angle of said arms or legs is 90° .

10 12. A tool according to Claim 10, wherein the included
angle of said arms or legs is 60° .

13. A tool according to Claim 10, wherein the included
angle of said arms or legs is 120° .

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25

AMENDED CLAIMS

[received by the International Bureau on 20 January 1997 (20.01.97);
original claims 1-13 replaced by amended claims 1-12 (3 pages)]

- 05 1. A drilling and dowelling tool comprising a body
 having one or more through holes therein, said body
 carrying at least one plate so as to enable said body to
 be accurately located relative to an item to be drilled,
 said body and/or said plate(s) being capable of receiving
10 packing plates and/or spacer plates which are releasably
 securable to said body and/or said plate(s) and which
 serve to adjust the effective position(s) of said plate(s)
 relative to said body.
- 15 2. A tool according to Claim 1, wherein means are
 securable to said body and/or said plate to enable the
 edges of said tool to be adjusted.
- 20 3. A tool according to Claim 1 or Claim 2, wherein said
 body is rectangular in cross-section and elongate, said
 body carrying at least one removable, adjustable side and/
 or end plate.
- 25 4. A tool according to Claim 3, wherein said body
 carries two plates which are located normal to each other
 and which are movably secured to the ends and sides of the
 body.

5. A tool according to any of Claims 1 to 4, wherein means are locatable between said plate(s) and said packing
05 plate(s) or spacer plate(s) to provide fine adjustment of the relative position(s) of said body and said plate(s).

6. A tool according to Claim 1, wherein said body is provided with a slidable member which is movable relative
10 to said body so that the positions of said through-holes in said body and a work-piece to be drilled may be relatively adjusted.

7. A tool according to any of Claims 1 to 6, wherein
15 said through-holes in said body have removable/replacable plugs or bushes located therein, said plugs or bushes each having a through-hole therein through which a drill bit may pass in use of the tool.

20 8. A tool according to Claim 1, wherein said body is constituted by a generally V-shaped member having one or more through-holes therein, said through-holes being located at the intersection of the arms or legs of the generally V-shaped member, each of said arms carrying a
25 removable plate.

9. A tool according to Claim 8, wherein said body has

two through-holes therein, said holes being of differing diameters.

05

10. A tool according to Claim 9, wherein the included angle of said arms or legs is 90° .

10

11. A tool according to Claim 9, wherein the included angle of said arms or legs is 60° .

12. A tool according to Claim 9, wherein the included angle of said arms or legs is 120° .

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FIG. 1

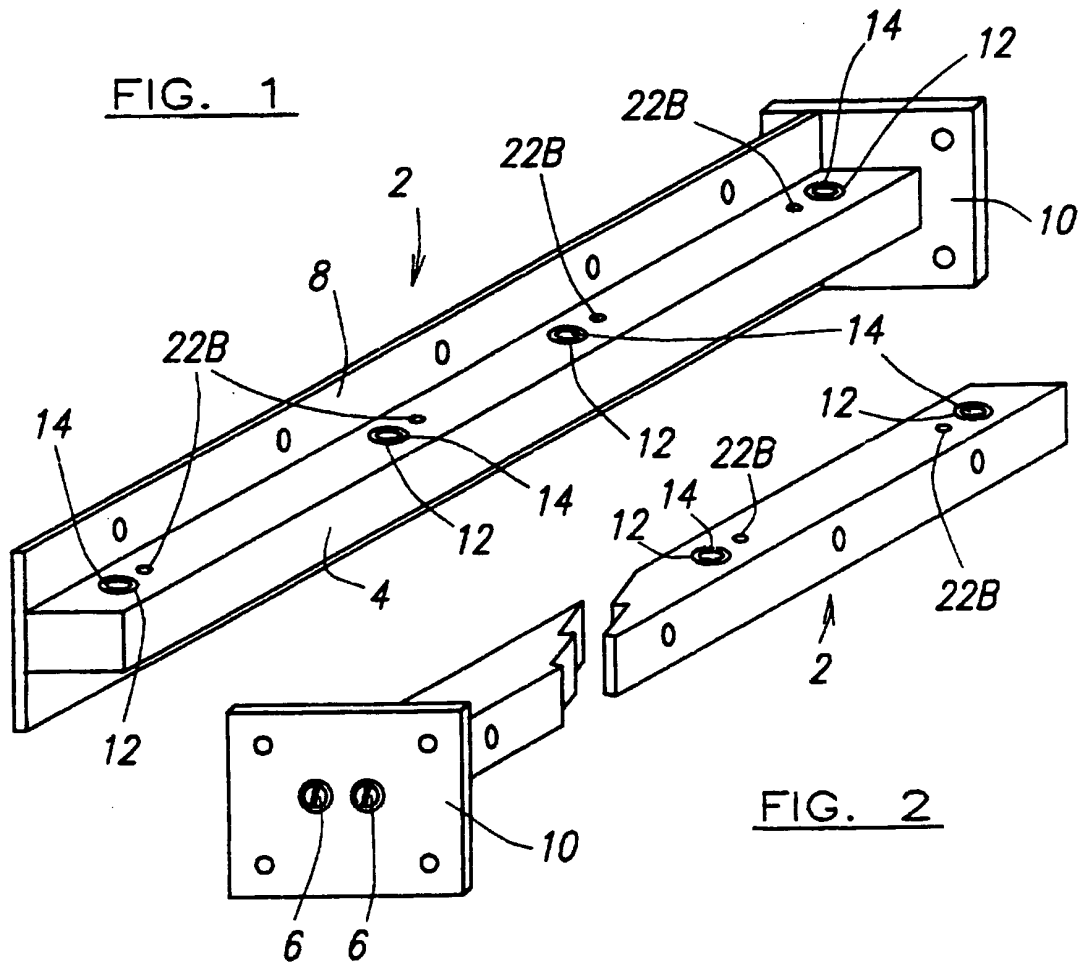


FIG. 2

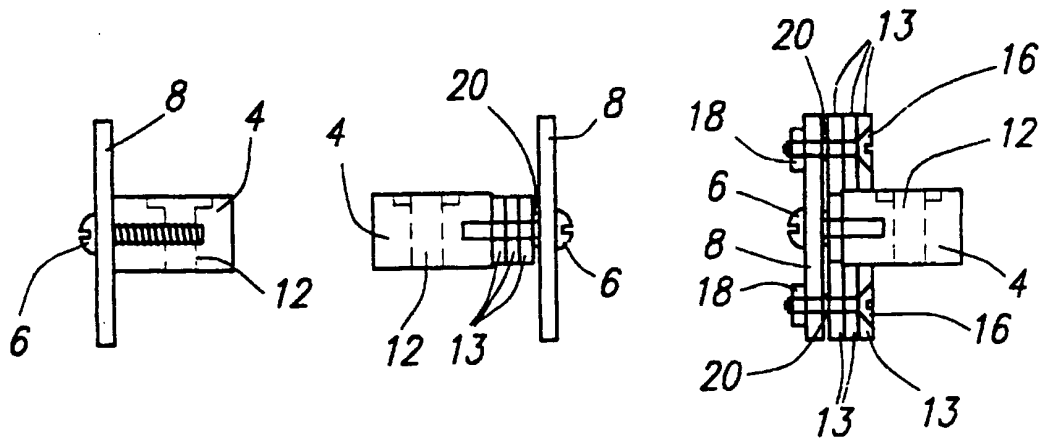


FIG. 3A

FIG. 3B

FIG. 3C

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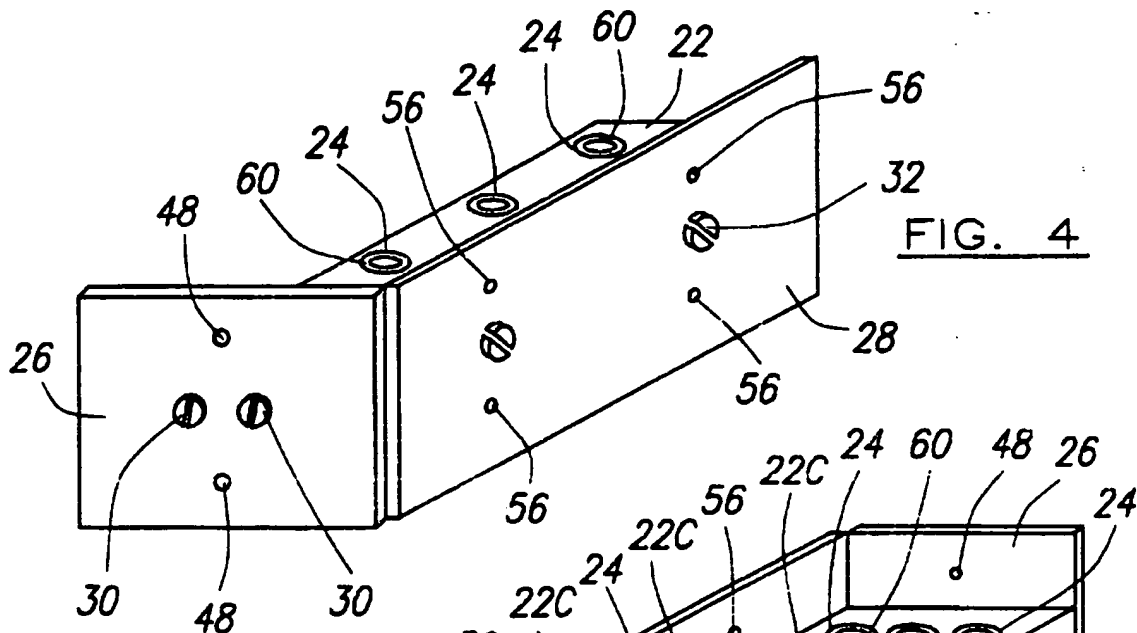


FIG. 4

FIG. 5

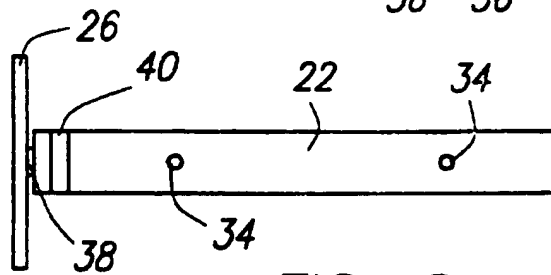
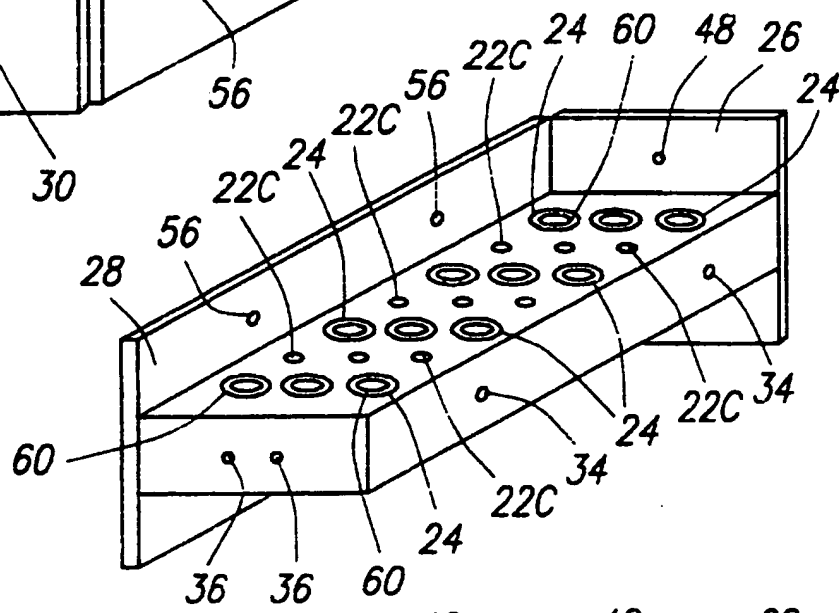


FIG. 6

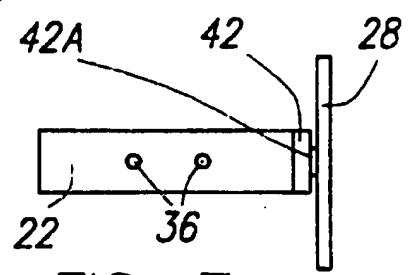


FIG. 7

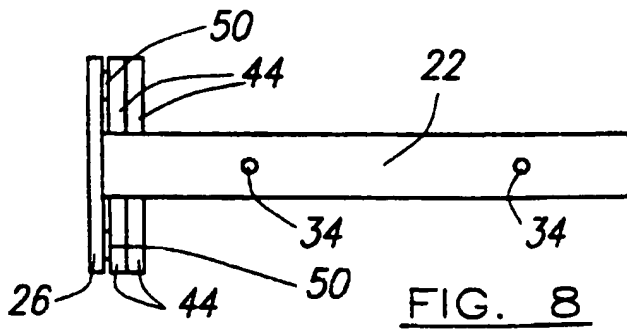


FIG. 8

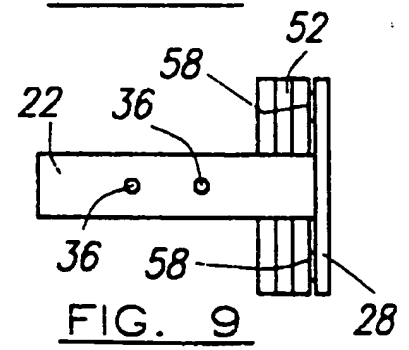


FIG. 9

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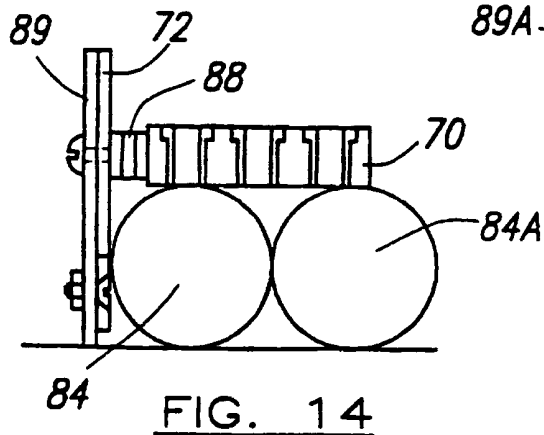
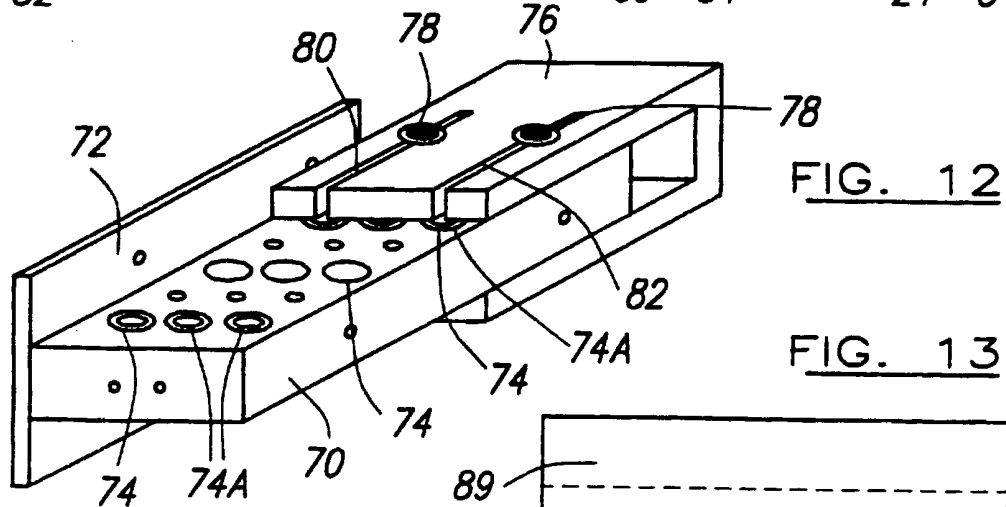
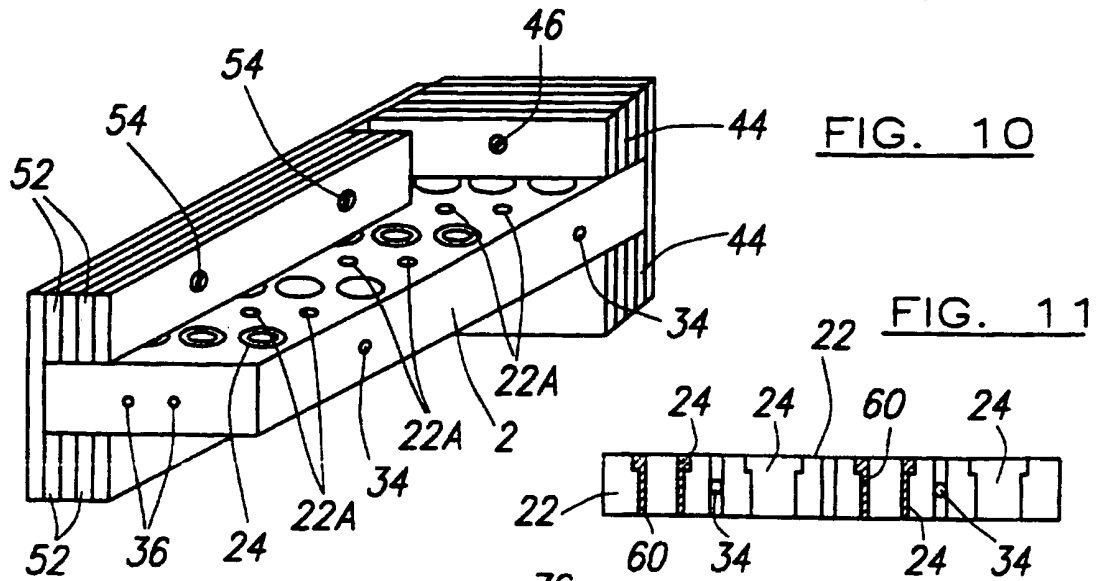
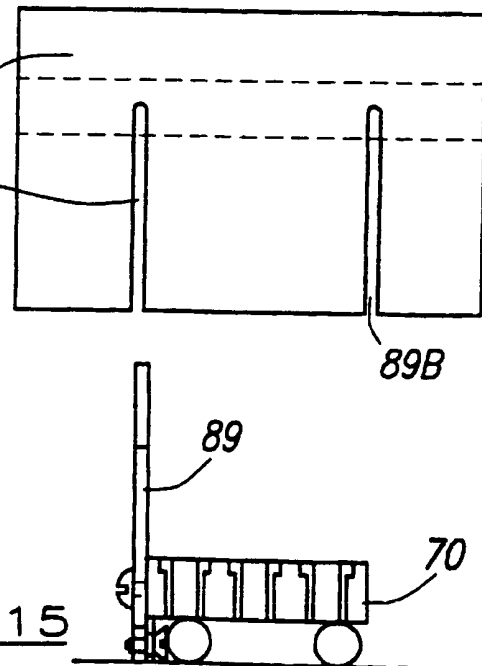


FIG. 15



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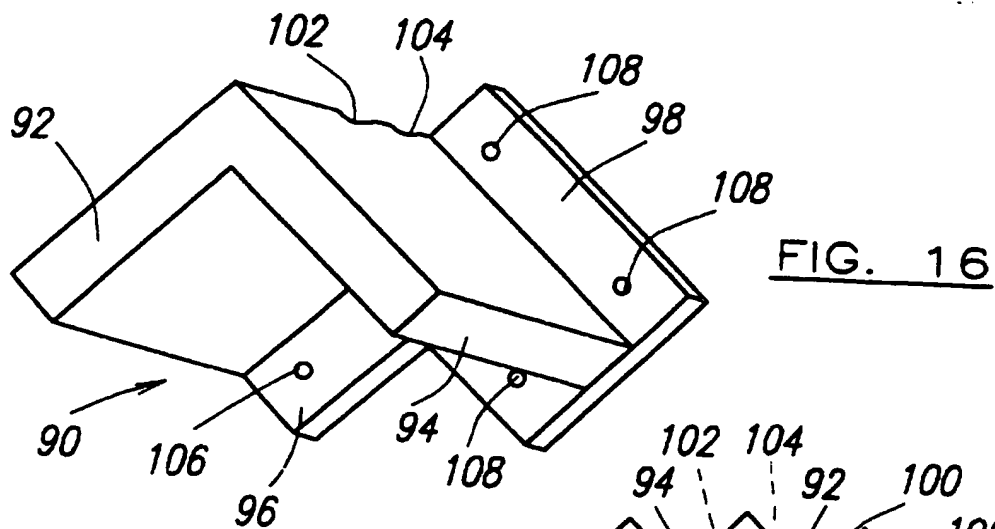


FIG. 18

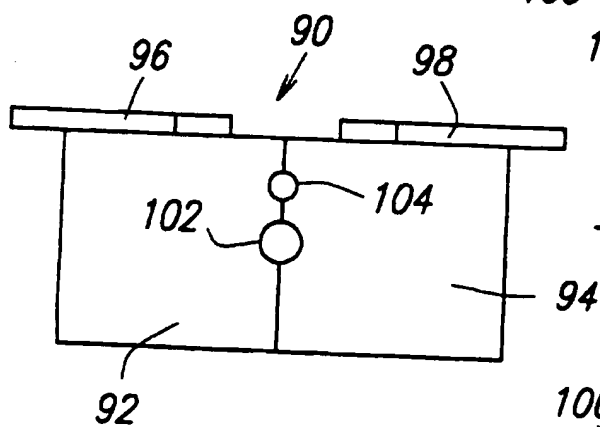
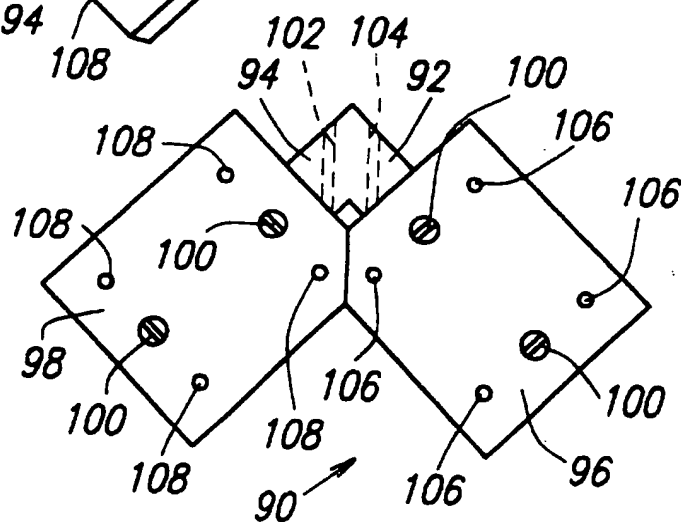
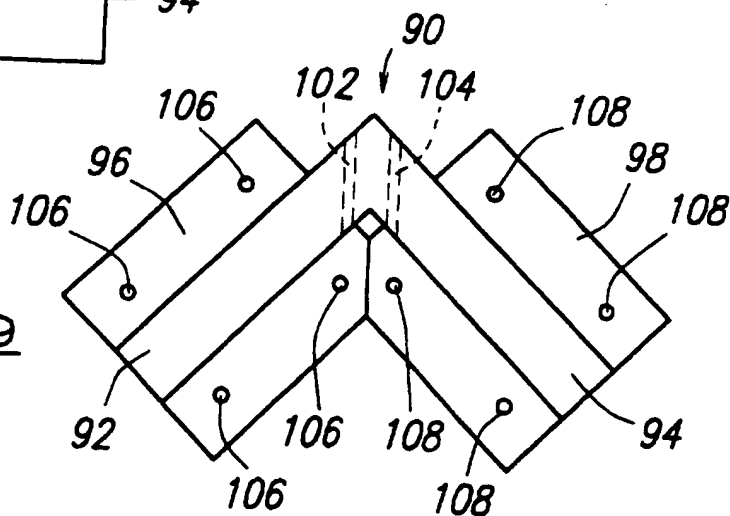


FIG. 19



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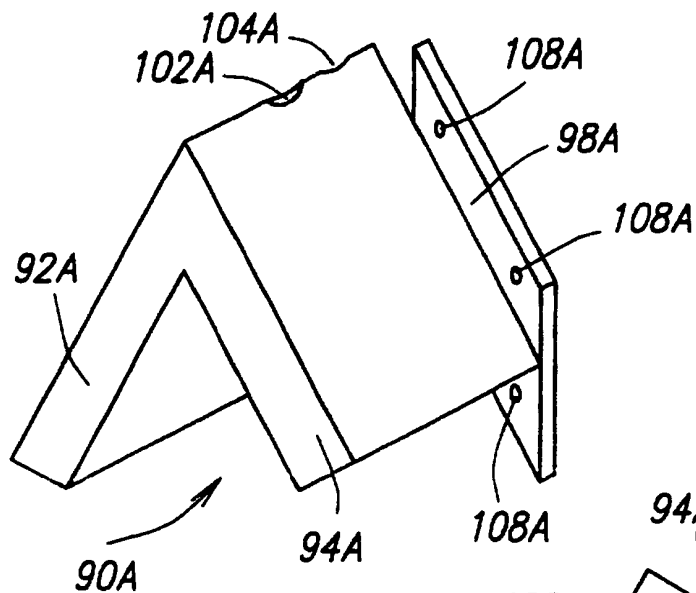


FIG. 20

FIG. 22

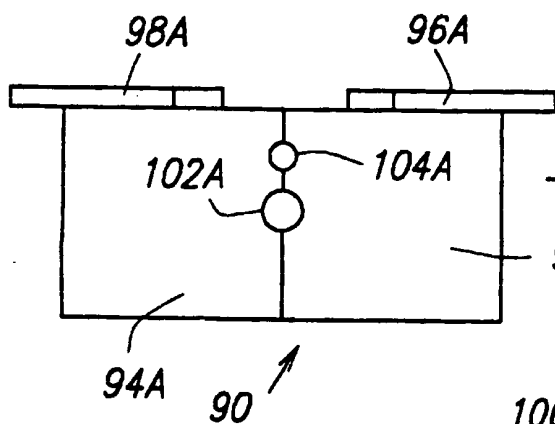
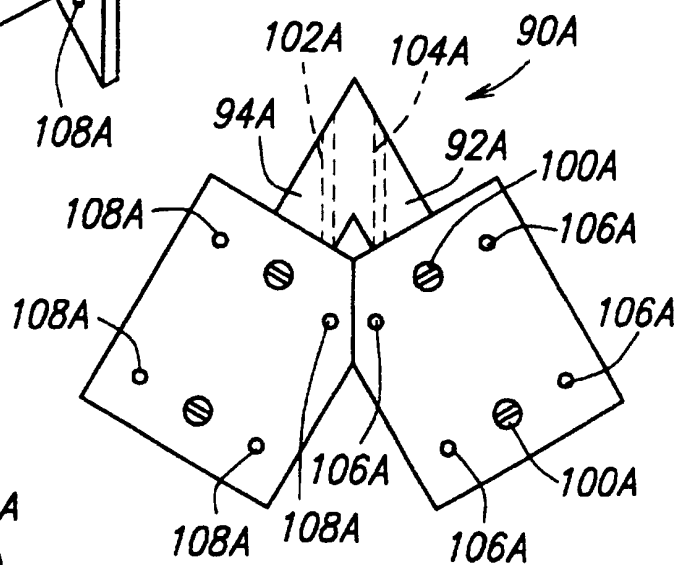
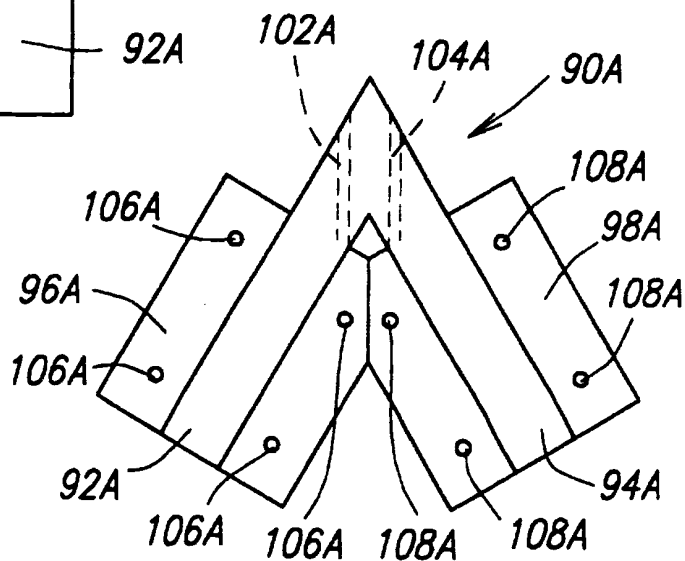
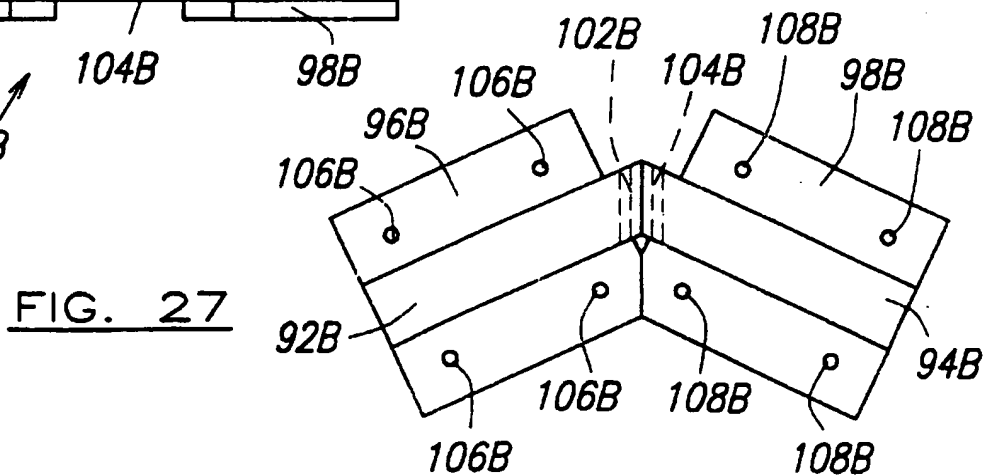
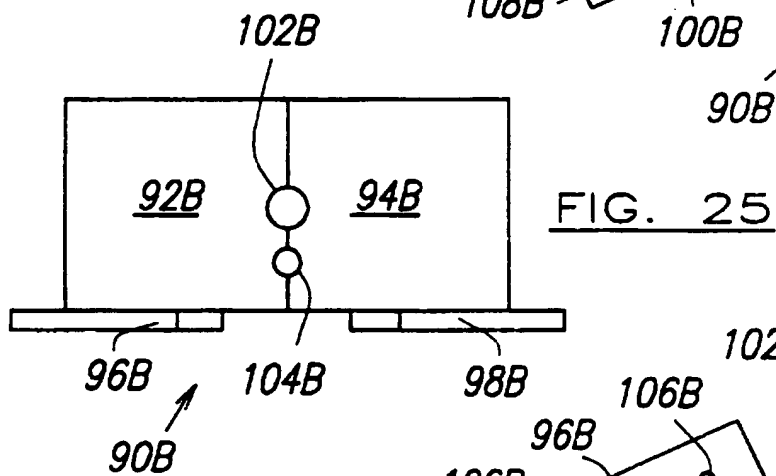
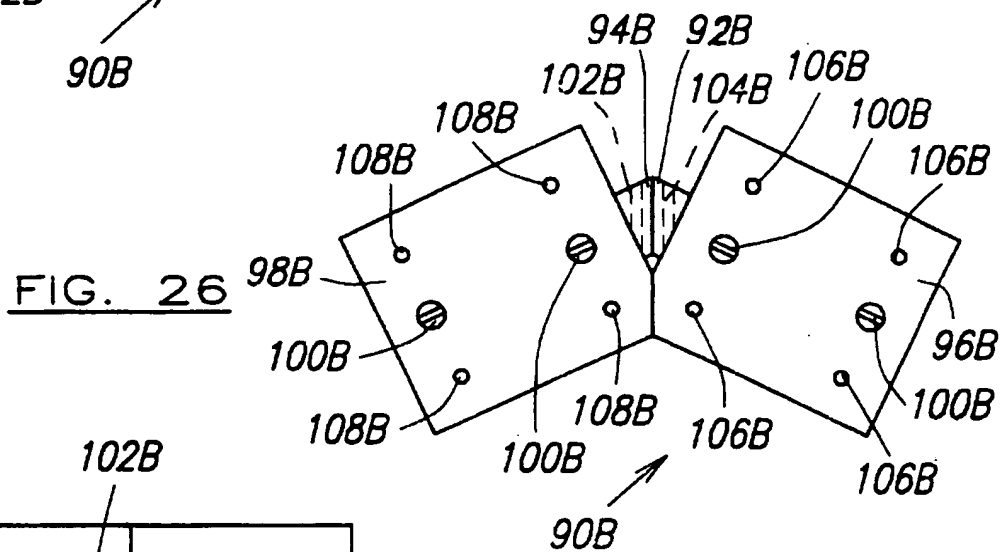
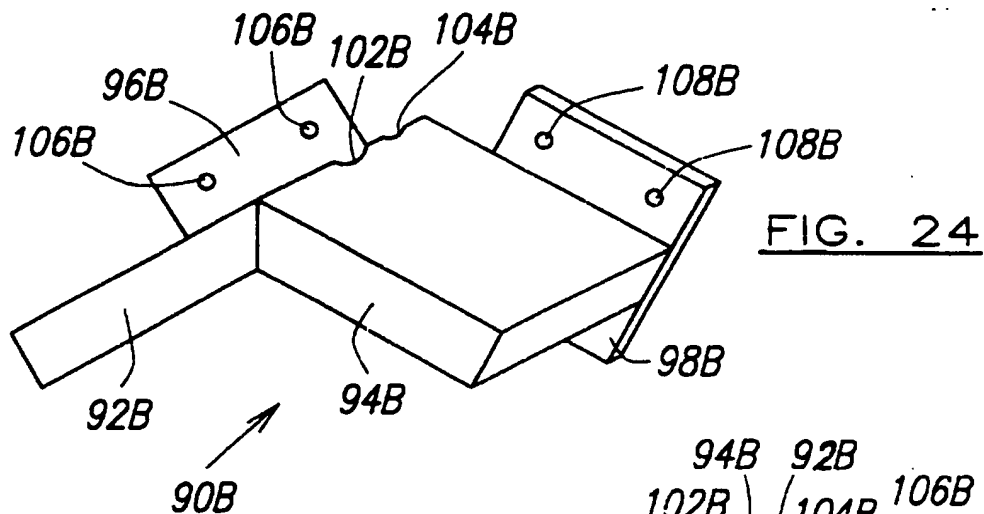


FIG. 21

FIG. 23



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/02478

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B23B47/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR,A,2 615 427 (CHOTARD) 25 November 1988 see page 2, line 10 - line 32 see page 3; figures 1,2,5,8 ---	1-8
X	FR,A,2 087 681 (SCHNEIDER) 31 December 1971 see page 1, line 30 - page 2, line 23; figures 1-3 ---	1-4,7,8
X	DE,C,44 25 446 (KRIPPNER) 16 March 1995 see column 2, line 11 - line 59; figures 1,2 ---	1-4,8
X	GB,A,2 092 488 (PEACOCK) 18 August 1982 see page 1, line 68 - line 76; figure 3 ---	1,5,6
X	EP,A,0 584 729 (KLAPPERICH) 2 March 1994 see column 3, line 18 - line 28; figure 1 ---	1,7
	-/--	

☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,29 10 567 (BRAUN) 18 September 1980 see page 6, last paragraph; figure 1 ---	1,9,11
A	FR,A,2 633 550 (VARICHON) 5 January 1990 see figures 1-4 ---	9-13
A	GB,A,2 158 747 (SIKORSKI) 20 November 1985 -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Patent Application No

PCT/GB 96/02478

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2615427	25-11-88	WO-A- 8911935	14-12-89
FR-A-2087681	31-12-71	NONE	
DE-C-4425446	16-03-95	NONE	
GB-A-2092488	18-08-82	NONE	
EP-A-584729	02-03-94	DE-A- 4228285 US-A- 5407306	03-03-94 18-04-95
DE-A-2910567	18-09-80	NONE	
FR-A-2633550	05-01-90	NONE	
GB-A-2158747	20-11-85	NONE	

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